## Best Practices for Schools HVAC maintenance

The best way to ensure routine maintenance occurs for all HVAC units is to have SOP's and a maintenance logbook for the HVAC systems. Often, due to lack of repair or maintenance, HVAC systems, if not the cause, exacerbate indoor air quality problems. The following list contains items that can be included in a maintenance program to reduce this risk. This list does not include maintenance of the mechanical components such as motors. Those items should be addressed following manufacturer's recommendations.

IAC 33-4-5 requires schools to establish and maintain a written procedure for routine maintenance of HVAC systems.

- 1. Unit Ventilators routine maintenance should include the following
  - a. clean intake and exhaust vents
  - b. clean drip pan and condensate drain line
  - c. clean coils
  - d. clean all accessible areas of interior of unit
  - e. insure fresh air damper linkage is functioning
  - f. clean air intake on exterior of building
  - g. if intake on ground level, check for pooling water along building
  - h. change filter (we suggest at minimum use a good quality pleated filter)
  - i. noise level should not be disruptive to students and teacher
  - j. with fresh air damper at lowest setting, supply sufficient outside air to maintain a maximum of 700 ppm carbon dioxide over the outdoor measurement (ASHRAE recommends 15 CFM outside air/person for classrooms)
  - k. all cleaning residue that causes irritation or respiratory distress should be flushed from system prior to students returning to classroom
- 2. Central systems- routine maintenance should include the following
  - a. clean intake and exhaust vents in rooms
  - b. examine ductwork behind supply and return vents for accumulated dust and or mold
  - c. clean coils
  - d. clean drip pan and condensate drain line
  - e. insure dampers are functioning properly
  - f. on automatic systems, with damper set at lowest setting, ensure minimum outside air to maintain maximum of 700 ppm carbon dioxide over the outside measurement (ASHRAE recommends 15 CFM outside air/person for classrooms)
  - g. check that fresh air intake is not blocked and no standing water or mold near intake. Do not allow birds to roost or nest on vents.
  - h. Ensure individual thermostats are working
  - i. Ensure individual room dampers are functioning properly
  - j. Clean or replace filters ( use good grade of filter)
  - k. Systems should have been balanced to ensure minimum movement of odors from one area to another and minimum fresh air requirement is met for all rooms

- 1. Examine outside air intakes for cleanliness, and ensure no standing water near the intake.
- m. all cleaning residue that causes irritation or respiratory distress should be flushed from system prior to students returning to classroom
- n. Check integrity of ductwork.

## 3. All systems

- a. Check to see area in front of air intakes is unobstructed (keep shrubs a minimum of 3 feet from air intakes)
- b. Check to ensure there is no standing water near air intakes
- c. Use air filters that have an acceptable minimum efficiency rating.
- d. Locate waste containers (both indoor and outdoor) away from any air intakes or air return vents.
- e. On new construction or renovations, air intakes and exhausts should be located so as to minimize the possibility of re-intrainment of exhaust gasses, car exhausts or other outdoor pollutants.

## Links:

EPA's best practices for Schools

http://www.epa.gov/region02/children/k12/english/k12-4of5.pdf

EPA's "Design Tools for Schools" Heating Ventilation and Air Conditioning Systems

http://www.epa.gov/iaq/schooldesign/hvac.html

EPA's "Should You Have the Air Ducts in Your Home Cleaned"

http://www.epa.gov/iaq/pubs/airduct.html

Minnesota Dept. of Health "Indoor Air Quality (IAQ) in Schools"

http://www.health.state.mn.us/divs/eh/indoorair/schools/

The following page is an example maintenance chart produced by the Minnesota Department of Health and amended by the Indiana State Department of Health

## Attachment 4: Example Preventive Maintenance Schedule Edit according to operational needs of each school building.

Beery 3   Every 6   Every 2   As						1
HVAC System Filters Replaced/Fitted Properly x x x x x x x x x x x x x x x x x x x		•	•		•	
Filters Replaced/Fitted Properly x		Months	Months	Annually	Years	Needed
Fan / Air Flow Direction x Belt Tension x Drain Pans Empty/Clean x Drain Pans Empty/Clean x Overall Cleanliness of Ducts and Unit x 15-20 percent of Air Delivered is Fresh x Calibration of System x Thermostats Functional x CLEANING SCHEDULE Cleaning of Heating Coils x Cleaning of Hoating Coils x Cleaning of Ductwork x AIR INTAKE Avoid Obstructions x Air Flows into duct x No Pollutant Sources Nearby x (garbage, idling vehicles, exhaust) Dampers Operational x LOCAL EXHAUST SYSTEMS Proper Exhaust Volume x Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned OTHER Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Clean Carpets, Strip and Wax Floors x X x Deep Clean Carpets, Strip and Wax Floors x X x Deep Clean Carpets, Strip and Wax Floors x X						
Belt Tension	1 1	X				X
Drain Pans Empty/Clean		X				
Drain Condensate lines cleaned Overall Cleanliness of Ducts and Unit 15-20 percent of Air Delivered is Fresh Calibration of System X Thermostats Functional X CLEANING SCHEDULE Cleaning of Heating Coils Cleaning of Oroling Coils X Cleaning of Drainage Areas X Cleaning of Ductwork X AIR INTAKE Avoid Obstructions X Air Flows into duct X No Pollutant Sources Nearby (garbage, idling vehicles, exhaust) Dampers Operational X LOCAL EXHAUST SYSTEMS Proper Exhaust Volume Air Direction Correct Fan Functional X Cutdoor Vent Checked / Cleaned OTHER Sewage Traps Filled with Water Weekly X Clean All Classroom Tables, Diffusers, Shelves X Deep Clean Carpets, Strip and Wax Floors X X X X X X X X X X X X X X X X X X X	Belt Tension			X		
Overall Cleanliness of Ducts and Unit  15-20 percent of Air Delivered is Fresh  Calibration of System  Thermostats Functional  CLEANING SCHEDULE  Cleaning of Heating Coils  Cleaning of Cooling Coils  Cleaning of Ductwork  AIR INTAKE  Avoid Obstructions  Air Flows into duct  No Pollutant Sources Nearby  (garbage, idling vehicles, exhaust)  Dampers Operational  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume  Air Direction Correct  Fan Functional  Outdoor Vent Checked / Cleaned  OTHER  Sewage Traps Filled with Water Weekly  Hazardous Chemicals Storage  Walk-off Mat Cleanliness  x  Clean All Classroom Tables, Diffusers, Shelves  x  x  Carpet Clean Carpets, Strip and Wax Floors  x  x  x  x  x  x  x  x  x  x  x  x  x	Drain Pans Empty/Clean	X				
15-20 percent of Air Delivered is Fresh		X				
Calibration of System         x           Thermostats Functional         x           CLEANING SCHEDULE         x           Cleaning of Heating Coils         x           Cleaning of Dooling Coils         x           Cleaning of Drainage Areas         x           Cleaning of Ductwork         x           AIR INTAKE         x           Avoid Obstructions         x           Air Flows into duct         x           No Pollutant Sources Nearby         x           (garbage, idling vehicles, exhaust)         y           Dampers Operational         x           LOCAL EXHAUST SYSTEMS         x           Proper Exhaust Volume         x           Air Direction Correct         x           Fan Functional         x           Outdoor Vent Checked / Cleaned         x           OTHER         x           Sewage Traps Filled with Water Weekly         x           Hazardous Chemicals Storage         x           Walk-off Mat Cleanliness         x           Carpet Cleanliness         x           Leaks, Stains, Moisture Inspection         x           Clean All Classroom Tables, Diffusers, Shelves         x           X         x      <	Overall Cleanliness of Ducts and Unit			X		
Thermostats Functional x  CLEANING SCHEDULE  Cleaning of Heating Coils x  Cleaning of Cooling Coils x  Cleaning of Ductwork x  AIR INTAKE  Avoid Obstructions x  Air Flows into duct x  No Pollutant Sources Nearby x  (garbage, idling vehicles, exhaust)  Dampers Operational x  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x  Air Direction Correct x  Fan Functional x  Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x  Carpet Cleanliness x  Clean All Classroom Tables, Diffusers, Shelves x  X  Deep Clean Carpets, Strip and Wax Floors x	-				X	
CLEANING SCHEDULE Cleaning of Heating Coils Cleaning of Cooling Coils Cleaning of Drainage Areas Cleaning of Drainage Areas Cleaning of Ductwork X AIR INTAKE Avoid Obstructions X Air Flows into duct X No Pollutant Sources Nearby X (garbage, idling vehicles, exhaust) Dampers Operational X LOCAL EXHAUST SYSTEMS Proper Exhaust Volume X Air Direction Correct X Fan Functional X Outdoor Vent Checked / Cleaned X OTHER Sewage Traps Filled with Water Weekly X Hazardous Chemicals Storage X Clean All Cleanliness X Clean All Classroom Tables, Diffusers, Shelves X Capet Clean Carpets, Strip and Wax Floors X X  X  X  X  X  X  X  X  X  X  X  X	Calibration of System				X	
Cleaning of Heating Coils Cleaning of Cooling Coils Cleaning of Drainage Areas Cleaning of Drainage Areas  Cleaning of Ductwork  X  AIR INTAKE  Avoid Obstructions  X  Air Flows into duct X  No Pollutant Sources Nearby X (garbage, idling vehicles, exhaust)  Dampers Operational X  Motors Operational X  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume X  Air Direction Correct X Fan Functional  Outdoor Vent Checked / Cleaned  OTHER  Sewage Traps Filled with Water Weekly Hazardous Chemicals Storage X  Walk-off Mat Cleanliness X Carpet Cleanliness X Clean All Classroom Tables, Diffusers, Shelves X  X Deep Clean Carpets, Strip and Wax Floors X  X	Thermostats Functional	X				
Cleaning of Cooling Coils         x           Cleaning of Drainage Areas         x           Cleaning of Ductwork         x           AIR INTAKE         x           Avoid Obstructions         x           Air Flows into duct         x           No Pollutant Sources Nearby         x           (garbage, idling vehicles, exhaust)         x           Dampers Operational         x           Motors Operational         x           LOCAL EXHAUST SYSTEMS         x           Proper Exhaust Volume         x           Air Direction Correct         x           Fan Functional         x           Outdoor Vent Checked / Cleaned         x           OTHER         x           Sewage Traps Filled with Water Weekly         x           Hazardous Chemicals Storage         x           Walk-off Mat Cleanliness         x           Carpet Cleanliness         x           Leaks, Stains, Moisture Inspection         x           Clean All Classroom Tables, Diffusers, Shelves         x           Deep Clean Carpets, Strip and Wax Floors         x	CLEANING SCHEDULE					
Cleaning of Drainage Areas  Cleaning of Ductwork  AIR INTAKE  Avoid Obstructions  Air Flows into duct  No Pollutant Sources Nearby  (garbage, idling vehicles, exhaust)  Dampers Operational  X  Motors Operational  X  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume  Air Direction Correct  X  Fan Functional  X  Outdoor Vent Checked / Cleaned  OTHER  Sewage Traps Filled with Water Weekly  Hazardous Chemicals Storage  Walk-off Mat Cleanliness  X  Carpet Cleanliness  X  Clean All Classroom Tables, Diffusers, Shelves  X  X  X  X  X  X  X  X  X  X  X  X  X	Cleaning of Heating Coils			X		
Cleaning of Ductwork x  AIR INTAKE  Avoid Obstructions x Air Flows into duct x No Pollutant Sources Nearby x (garbage, idling vehicles, exhaust) Dampers Operational x  Motors Operational x  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	Cleaning of Cooling Coils		X			
AIR INTAKE  Avoid Obstructions	Cleaning of Drainage Areas		X			
Avoid Obstructions Air Flows into duct No Pollutant Sources Nearby (garbage, idling vehicles, exhaust) Dampers Operational Motors Operational  LOCAL EXHAUST SYSTEMS Proper Exhaust Volume  Air Direction Correct  Fan Functional  Outdoor Vent Checked / Cleaned  OTHER Sewage Traps Filled with Water Weekly Hazardous Chemicals Storage  Walk-off Mat Cleanliness  Carpet Cleanliness  Leaks, Stains, Moisture Inspection  Clean All Classroom Tables, Diffusers, Shelves  X  X  Va  Va  Va  Va  Va  Va  Va  Va	Cleaning of Ductwork					X
Air Flows into duct x No Pollutant Sources Nearby x (garbage, idling vehicles, exhaust) Dampers Operational x Motors Operational x LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned x OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	AIR INTAKE					
No Pollutant Sources Nearby (garbage, idling vehicles, exhaust)  Dampers Operational  Motors Operational  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume  Air Direction Correct  Fan Functional  Outdoor Vent Checked / Cleaned  OTHER  Sewage Traps Filled with Water Weekly  Hazardous Chemicals Storage  Walk-off Mat Cleanliness  X  Carpet Cleanliness  Leaks, Stains, Moisture Inspection  Clean All Classroom Tables, Diffusers, Shelves  X  X  Motors Operational  X  X  X  X  X  X  X  X  X  X  X  X  X	Avoid Obstructions	X				
(garbage, idling vehicles, exhaust)  Dampers Operational x  Motors Operational x  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x  Air Direction Correct x  Fan Functional x  Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x  Hazardous Chemicals Storage x  Walk-off Mat Cleanliness x  Carpet Cleanliness x  Leaks, Stains, Moisture Inspection x  Clean All Classroom Tables, Diffusers, Shelves x  Deep Clean Carpets, Strip and Wax Floors x	Air Flows into duct	X				
Dampers Operational x  Motors Operational x  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x  Air Direction Correct x  Fan Functional x  Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x  Hazardous Chemicals Storage x  Walk-off Mat Cleanliness x  Carpet Cleanliness x  Leaks, Stains, Moisture Inspection x  Clean All Classroom Tables, Diffusers, Shelves x  Deep Clean Carpets, Strip and Wax Floors x	No Pollutant Sources Nearby	X				
Motors Operational x  LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume x Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	(garbage, idling vehicles, exhaust)					
LOCAL EXHAUST SYSTEMS  Proper Exhaust Volume	Dampers Operational	X				
Proper Exhaust Volume  Air Direction Correct  Fan Functional  Outdoor Vent Checked / Cleaned  OTHER  Sewage Traps Filled with Water Weekly  Hazardous Chemicals Storage  Walk-off Mat Cleanliness  Carpet Cleanliness  x  Leaks, Stains, Moisture Inspection  Clean All Classroom Tables, Diffusers, Shelves  x  x  Deep Clean Carpets, Strip and Wax Floors  x	Motors Operational	X				
Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	LOCAL EXHAUST SYSTEMS					
Air Direction Correct x Fan Functional x Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	Proper Exhaust Volume			X		
Outdoor Vent Checked / Cleaned x  OTHER  Sewage Traps Filled with Water Weekly x  Hazardous Chemicals Storage x  Walk-off Mat Cleanliness x  Carpet Cleanliness x  Leaks, Stains, Moisture Inspection x  Clean All Classroom Tables, Diffusers, Shelves x  Deep Clean Carpets, Strip and Wax Floors x				X		
OTHER  Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	Fan Functional			X		
Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x x Deep Clean Carpets, Strip and Wax Floors x	Outdoor Vent Checked / Cleaned			X		
Sewage Traps Filled with Water Weekly x Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x x Deep Clean Carpets, Strip and Wax Floors x	OTHER					
Hazardous Chemicals Storage x Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x	Sewage Traps Filled with Water Weekly	X				
Walk-off Mat Cleanliness x Carpet Cleanliness x Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x x Deep Clean Carpets, Strip and Wax Floors x			X			
Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x x Deep Clean Carpets, Strip and Wax Floors x	_	X				
Leaks, Stains, Moisture Inspection x Clean All Classroom Tables, Diffusers, Shelves x x Deep Clean Carpets, Strip and Wax Floors x	Carpet Cleanliness	X				
Clean All Classroom Tables, Diffusers, Shelves x Deep Clean Carpets, Strip and Wax Floors x x	-	X				
Deep Clean Carpets, Strip and Wax Floors x x	-					X
			X			X
	Water stained ceiling tile should be replaced	X				